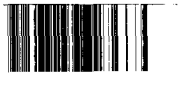
TRENDS IN PUBLIC INVESTMENT

The Congress of the United States
Congressional Budget Office



NOTE

Unless otherwise noted, all values are in 1982 prices and all years are calendar years.

PREFACE

Have the large federal budget deficits of the 1980s financed public consumption at the expense of private investment, as official data indicate? Or has some federal spending bought public investments that, like their private counterparts, contribute to national wealth? This study examining these issues was prepared for the Joint Economic Committee of the United States Congress.

The study was written by Jenifer Wishart of the Natural Resources and Commerce Division under the supervision of Everett M. Ehrlich. Many people contributed to the development of the report. Within CBO, Frank S. Russek, Marvin M. Phaup, Robert W. Hartman, R. William Thomas, Maureen McLaughlin, Daniel Koretz, and David Elkes made helpful suggestions, while Andrew Haughwout, Mark A. Weatherly, and R. Mark Musell contributed important data. John C. Musgrave and David J. Levin of the Department of Commerce provided valuable assistance on national income concepts and measures. Francis Pierce edited the manuscript. Gwen Coleman and Kathryn Quattrone prepared the paper for publication.

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CONTENTS

	SUMMARY	ix
I	INTRODUCTION	1
II	DEFINING PUBLIC INVESTMENT	7
	The NIPA Concept of Investment *7*	
	Extended Concepts of Capital *10*	
III	VALUING FEDERAL INVESTMENTS	17
	Measuring Federal Investment Outlays *19*	
	Measuring Federal Investment Subsidies *20*	
	Depreciation Rules *25*	
IV	DIRECT FEDERAL INVESTMENT	33
	Measuring Physical Investment--the NIPA Story *33*	
	Effect on Saving and Investment Measures *44*	
V	EXTENDING CAPITAL CONCEPTS	47
	Investment in Defense Assets *48*	
	Investment in Intangible Capital *50*	
	Loans and Grants to Other Sectors *57*	
	Subsidies for Investment in Human Capital *70*	
	Overall Effects of Extending Capital Concepts on National Saving and Investment Rates *76*	
APPENDIXES		
A	Assumptions About Service Lives and Retirement Patterns for Government Physical Capital *83*	
B	Estimates of Gross Investment (In 1982 Prices) *89*	

TABLES

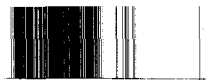
1.	The Share of National Output Devoted to Investment and Saving	3
2.	Federal Expenditures Qualifying as Investment under Different Concepts of Capital	14
3.	Net Federal Physical Investment after Deducting Assets Withdrawn from Service	36
4.	Net Federal Physical Investment after Deducting Equal Annual Amounts for Depreciation	38
5.	Effect of Varying Assumptions for Depreciation Estimates on Net Investment for Conservation and Development of Water and Energy Resources	41
6.	Net Investment in Defense Assets	50
7.	Federal and Private Net Investment in Intellectual Capital through Research and Development	54
8.	Net Physical Investment by States and Localities from Grants and Other Sources	60
A-1.	Bureau of Economic Analysis Assumptions About Service Lives for Government Physical Capital	84
A-2.	Bureau of Economic Analysis Assumptions About Retirement Patterns	86
B-1.	Gross Federal Physical Investment	90
B-2	Gross Investment in Defense Assets	92
B-3.	Private Gross Investment in Intellectual Capital through Research and Development	93
B-4.	Federal Gross Investment in Intellectual Capital through Research and Development	94
B-5.	Physical Investment Financing through Grants to States and Local Governments	96

FIGURES

S-1.	Net Investment Attributable to Federal Budgets under Different Concepts	xiv
1.	Net National Saving and Investment as Percent of Net National Product	4
2.	Measures of Federal Physical Investment	40
3.	Completion Cost and Rate of Return on Recent Water Projects	43
4.	Effects of Federal Investment on National Saving and Investment Rates	45
5.	Effect of Investment in Defense Assets on National Saving and Investment Rates	51
6.	Effect of Investment in Research and Development on National Saving and Investment Rates	57
7.	Net Investment in Highways by Source	63
8.	Investment in Wastewater Treatment	65
9.	Resources Available for Transit Investment	68
10.	Effect of Federal, State, and Local Physical Investment on National Saving and Investment Rates	71
11.	Overall Effects of Different Capital Concepts on National Net Investment and Public Saving	78

BOX

1.	Saving and Investment	2



SUMMARY

The great increase in federal deficits in recent years has given rise to fears that federal borrowing may be financed from private savings that would otherwise be available for business investment. In response, some analysts have suggested that much federal spending represents productive investment that adds to the nation's wealth. If so, the deficits have not represented as large a drain on domestic saving as their numerical size would suggest. The decline in net private domestic investment in the 1980s may, in this view, have been partly offset by the investments made by the federal government. Some analysts also argue that federal investment contributes to the long-run strength of the economy by stimulating private investment in certain areas that would otherwise be neglected.

The extent to which federal spending has added to the nation's wealth depends on the answers to two questions:

- Which forms of federal spending are investment?
- How is the value of these federal investments to be assessed?

WHAT IS INVESTMENT?

Investment may be broadly defined as activity that creates assets having value because they produce future output and income. The National Income and Product Accounts (NIPA) of the Department of Commerce treat as fixed investment all expenditures on new business plant and equipment, and purchases of new dwellings by homeowners. Both of these yield future income or output: firms use their plant and equipment in the production of goods or services; and households owning their houses receive a flow of services from the use of their dwellings (imputed by NIPA as a rental income).

The NIPA view is a restrictive one. In current NIPA accounting, government purchases of long-lived fixed facilities are not considered

as investment even when they are made by such industrial entities as the power marketing authorities. This is because the purchases cannot clearly be shown to produce income (as officially measured). The only correction now made to deficits or surpluses in public-sector accounts in the NIPA is for federal lending and land transactions (both representing asset exchanges, not investment), which are netted from total federal expenditures. All other expenditures--whether to construct federal buildings, pay employees, provide funds to states or grants to individuals, or to promote scientific, military, or commercial goals--are treated as consumption. The difference between government revenues and expenditures thus represents public saving or dissaving. National saving is the sum of public and private saving.

But some federal expenditures could be seen as investment without violating the spirit of the NIPA approach--that investment produces future income or benefits. Government saving would then be increased by the value of gross federal investment in any year, and decreased by the annual depreciation of past investments (capital consumption). Such public investment would then become a component of net national fixed investment.

If the NIPA rules for private investment were applied to federal activities, the following might be counted as federal investment: purchases of physical assets used to produce economic services such as irrigation water, electric power, or office space; purchases of equipment operated by federal agencies (such as vehicles and computers); and construction of long-lived structures that are not used directly in economic activity but that have counterparts in private firms, such as airplane hangars used by the military forces.

The NIPA concept of investment might also be extended to include other long-lived assets that produce income or other benefits in the future, although these inclusions would require parallel changes in the treatment of nonfederal activities as well. Such extensions could include:

- Defense Weaponry. Major defense systems are long-lived and produce a stream of future benefits in the form of deterrence even if these benefits are not reflected in national income accounting.

- Research and Development Activity. Scientific findings create future income. Research and development activity (under both federal and private financing) could therefore be deemed a form of investment. Comparable expenditures in the private sector are now accounted as operating expenses, so the NIPA data would have to be adjusted to maintain consistent national income and investment totals.

- Investment Grants to Other Sectors. Federal policies subsidize investment by other sectors. Federal assistance, for example, defrays much of the cost of building highways and other infrastructure. The federal "share" of these investments could be credited to national investment totals, but would be treated as a part of state and local government investment.

- Human Capital. Some economists view workers' stocks of knowledge and skill as capital, comparable with plant and equipment. Expenditures to build these stocks, such as those for education and training, could be viewed as investment. Again, comparable private expenditures would have to be similarly adjusted, and federal aid might be considered as adding to investment totals in the sectors where education expenditures are made.

MEASUREMENT PROBLEMS

After identifying certain federal activities as investment, the question arises how to value them. A dollar's worth of federal investment must be "as good" as a dollar's worth of private investment if it is to be counted equally. Market signals lead private investment values to reflect the economic wealth they create. But comparable federal investments--large dams, for example--are constructed not only for their economic benefits, but to achieve broader, social goals as well. In some cases, these noneconomic goals may detract from the economic contribution of federal investments; in others, the economic effects may be broadly cast and difficult to attribute to the investment. Moreover, some private investments fail and others receive subsidies through the tax system or other mechanisms.

In the NIPA accounts, all private investment is valued at its purchase cost. While such treatment can be defended for private investment that satisfies a market test, it could be less defensible for government investment. On the other hand, it is difficult to value government investment in any way other than to use its purchase cost. That procedure is used in this study.

Another measurement problem concerns depreciation--assigning a value to the portion of the capital stock worn out each year by use, age, or obsolescence. In business, depreciation accounting rules are based on the tax code, prices of secondhand equipment and structures, and on industry practices regarding useful lives and replacement rates. But for much government investment, these rules and practices have not been developed.

In this analysis, two methods were used for depreciating physical assets: deducting equal annual amounts from an asset's value over its estimated service life (as defined for these purposes by the Department of Commerce's Bureau of Economic Analysis), and deducting the entire value of the asset in the year it is assumed to be withdrawn from service. The second measure generally gives a higher estimate of net public investment, since the assets created by recent higher levels of spending in all federal activities are yet to be withdrawn from service, and therefore are not depreciated. Defense assets are depreciated according to the first rule (often called straight-line depreciation) because it reflects the combination of technological obsolescence and physical wear and tear to which such assets are subject better than the inventory approach that the second rule implies.

The depreciation of intangible assets, such as those resulting from investment in research and development (R&D), raises other problems. The capital value of the application of scientific knowledge to a specific product or process (the development part of R&D) is assumed, in the estimates that follow, to depreciate evenly over a 10-year period beginning five years after the expenditures are made. This is done to reflect a gradual reduction in the productivity of earlier development activity as innovations are embodied in new products. This estimate of net investment in R&D is less sensitive to the depreciation rate used than to the choice of R&D activities that may be considered capital-creating.

RESULTS

When measured under the NIPA concept applied to firms and households, federal investment does not contribute a very large part of total national investment. It is heavily concentrated in large construction projects (such as dams and other water resource improvements) and other physical plant. If these are depreciated on a straight-line basis, net federal investment over the last 15 years has averaged about zero, with annual additions or subtractions no greater than $2 billion (in 1982 prices). Using the other measure of depreciation, which writes off assets only when withdrawn from service, net investment by the federal government has averaged about $4 billion annually (again in 1982 prices) over this time period.

The largest sources of net investment have been in dams and other resource conservation structures, and in industrial equipment (as used, for example, in federal ship construction) owned and operated by the federal government. The largest sources of net disinvestment have been in military structures, such as hangars and barracks. In many cases, however, the depreciation charges calculated for military structures are overstated since the structures themselves are often obsolete or exceed peacetime requirements.

Were federal investment measured using broader concepts it would add as much as $60 billion to net national investment in 1986 (in 1982 prices):

- Net spending on defense assets would add $17 billion;
- Net federal research and development aimed at commercial innovation would add $10 billion to $20 billion; and
- Federal subsidies for state and local physical investment (such as infrastructure) would add a net $11 billion to $22 billion.

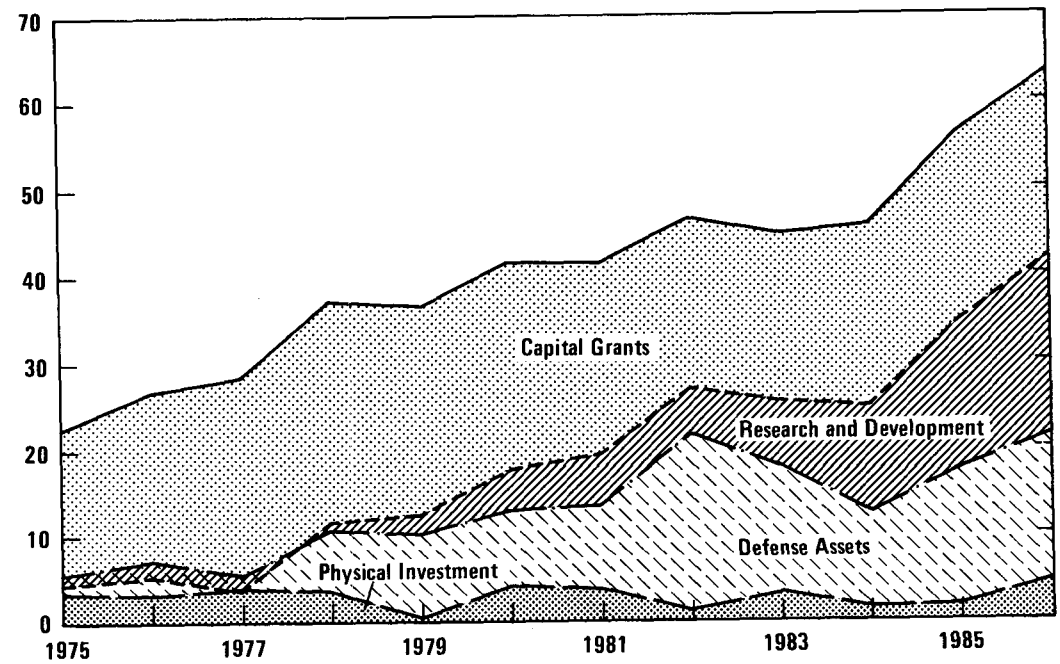
Trends in investment under the NIPA concept and these three extended concepts of capital are shown in the Summary Figure. Federal spending on education and training assistance totaled around

$20 billion in 1986, but this overstates the gross addition to human capital that many analysts would attribute to such federal assistance because these subsidies sometimes accrue to individuals who would have pursued education without them. Moreover, no reliable estimates of depreciation can be formulated for education investments.

Net investment in defense assets--weapons, ships, aircraft, and the structures that support them--has increased dramatically since the 1970s. In the first half of that decade, net investment--compared with a gross investment of around $20 billion a year--was negative. Steady increases beginning in 1975 brought gross investment to $33 billion by 1979, and raised net investment to $10 billion. Increases in both gross and net totals continued until 1982 when gross investment reached $47 billion, and net investment peaked at $21 billion. In

Summary Figure.

Net Investment Attributable to Federal Budgets Under Different Concepts (NIPA basis, in billions of dollars, at 1982 prices)



SOURCE: Congressional Budget Office, based on data from Bureau of Economic Analysis, National Science Foundation, and Office of Management and Budget.

NOTE: The figure shows the larger measure of net investment under each concept.

1986, net investment of $17 billion came from gross investment of $56 billion. Differences between gross and net investment in this case reflect straight-line depreciation estimates. Calculating depreciation charges for the stock of weaponry is an uncertain exercise, although it is undeniable that weapons are exposed to technical obsolescence and to wear and tear.

Net investment in research and development has also increased dramatically in the 1980s, rising from negative levels in the mid-1970s to $20.3 billion in 1986. Most of the increase has occurred in military development applications, which have risen from negative amounts as late as 1982 to $12.4 billion in 1986. But 90 percent of military R&D spending is for development (including the procurement of prototypes), with only the remaining 10 percent for basic or applied research with broader applications. Excluding the development part of military R&D, and also other noncommercial development in the space, health, and environment R&D programs, puts net federal R&D investment at around $11 billion annually throughout much of the last decade.

A further expansion of the definition of federal investment would include federal financing of investment in other sectors--most notably, income transfers made to support the infrastructure investments of state and local governments. Since 1982 the federal government has financed approximately $11 billion per year in net state and local government infrastructure investment, down from a peak of about $18 billion in 1978 (using straight-line depreciation). If depreciation is deferred until assets are withdrawn from service, however, net investment has totaled about $20 billion annually since 1982, compared with levels of around $25 billion in the late 1970s. To some extent, lower levels of net investment in the 1980s under both estimates reflect lower federal spending for all infrastructure except highways and airports. In addition, one-time emergency public works investments made in the mid-1970s are now depreciating, reducing the net investment total.

Much federal spending is dedicated to the general functions of education and training. These activities are often thought of as creating "human capital," a form of wealth in its own right. But many people pursue education or training for other than investment or job-

related purposes, so that the returns to these activities are often nonmonetary. There is no satisfactory way of separating investment and personal spending in this category. Moreover, selecting a rate of depreciation is virtually impossible.

Federal spending on education and training services, according to the NIPA, rose from around $23 billion in 1975 to a peak of around $25 billion in 1980 before falling to the current level of about $17 billion (all in 1982 dollars). To this may be added the value of loan subsidies offered by the federal government for education and training; these were worth approximately $2.9 billion in 1986. The value of these loans has risen in the past 10 years, but not by enough to offset the diminution in spending. These are raw data, however. They do not separate what are clearly investment activities from those that are avocational. Nor do they reflect the inherent depreciation of past education and training.

Despite the rising level of net federal investmentlike spending, however, adjusting official data in these ways would not offset the fall-off in net private fixed investment evident during the 1980s. Net federal physical investment (less than $4 billion a year) has remained at about 0.1 percent of net national product (NNP), while the rate of private domestically owned fixed investment has fallen by around half, from just over 7 percent of NNP in the early 1980s to under 4 percent in the five-year period 1982-1986. Under the broader federal investment concepts, federal net investment does not exceed 0.6 percent to 0.7 percent of NNP for each concept, adding at most only about 2 percent to the official estimate of the ratio of investment to NNP, split about equally between the federal (1.2 percent of NNP) and state and local governments.

CHAPTER I

INTRODUCTION

A major source of concern with record levels of the federal deficit arises from their inhibiting effect on private investment. In fact, the 1980s have witnessed an increase in deficits simultaneous with declines in both net private domestic investment and saving. As deficits rose from slightly under 2 percent of net national product (NNP) in the 1970s to about 5.4 percent of NNP in the 1982-1986 period, net private domestically owned investment fell from an average of 8.5 percent of NNP in the 1970s (and a cyclical high of 8.4 percent in 1979) to an average of 3.7 percent in the 1980s.1/ A parallel decline occurred in domestic saving. (Box 1 defines saving, investment, and capital formation.)

Deficits are sometimes said to "crowd out" private investment by competing for funds in capital markets. To the extent that this occurs, it means that the economy will grow at a slower rate and that future living standards will be lower than otherwise. In recent years, the crowding-out effect was ameliorated by inflows of capital from abroad. As foreign indebtedness increases, however, a rising percentage of future output must be sent abroad to repay foreign lenders.

This view of deficits is predicated on the assumption that federal spending is consumption rather than investment. Official data do not count any of the expenditures of federal, state, or local governments as investment. Thus, in the National Income and Product Accounts (NIPA), almost all federal spending is considered public consumption, and deficits are therefore a form of public dissaving.2/ In NIPA data,

1. Net national product is gross national product minus allowances for depreciation. Thus, it measures the net amount available to finance consumption and investment.

2. NIPA estimates of federal spending deduct only land purchases and lending transactions from the spending total.

BOX I.
SAVING AND INVESTMENT

"Saving" is that portion of the flow of national income not consumed in any one year. Saving is an addition to the nation's wealth: it diverts resources from current consumption and makes them available for future consumption.

"Investment" is the purchase of durable goods that are used to make other goods and services in the future. Just as saving adds to the nation's wealth, investment adds to its capital stock--after taking into account the depreciation that naturally occurs to the capital stock as it wears out or becomes obsolescent.

In a world without foreign trade and with balanced government budgets, the nation's private saving would of necessity be equal to its investment. In an accounting sense, private saving is that portion of income that is not consumed, while investment is that portion of output that is not consumed. Since the nation's income ultimately is equal to the value of its output (as income can only be earned by producing some form of output) saving and investment must also be equal. The National Income and Product Accounts (NIPA) express this identity by stating that:

Saving (S) = Investment (I)

A government deficit can be incorporated into this balance. The government's fiscal surplus is public saving, and is available for the same purposes as is its private counterpart. Alternatively, when government spending (G, in the NIPA) exceeds tax revenues (T), the deficit (G-T) must be financed through borrowing. This borrowing must originate in private saving. Thus, fiscal deficits are a form of public dissaving. The NIPA add the government deficit to the saving/investment identity as follows:

S = I + the Deficit (G-T)

Foreign trade can be incorporated as well. When the nation has a trade deficit--in NIPA nomenclature, when imports (M) exceed exports (X)--the economy must borrow money from abroad to finance its excess purchases of foreign goods. This borrowing from abroad--net capital inflow--is a debt incurred by the nation that detracts from saving. Alternatively, when the nation runs a trade surplus--when exports exceed imports--it accumulates the foreign currency that was used to purchase its goods. It can use this currency to purchase foreign assets. But the funds for these purchases of foreign assets must be taken from domestic saving. Thus, private domestic saving must cover investment, the government's deficit, and the purchase of foreign assets financed by a trade surplus. Domestically owned private investment is then the sum of investment (I) and the trade surplus (X-M). When the economy engages in international trade, lending, and borrowing, the NIPA identity is extended as follows:

S = I + (G-T) + the Trade Surplus (X-M)

The effects of government deficits can be explained in the context of this identity. If the deficit (G-T) increases, then three possibilities exist for restoring the inevitable mathematical balance described by this equation:

- o Private domestic saving can increase;
- o Investment can decrease; or
- o The trade surplus can decrease (or, alternatively, the trade deficit can increase).

There is little reason to believe that private saving will increase simply because deficits become larger. While some economists have attempted to develop a theoretical reason why it would, most evidence runs to the contrary--particularly the dramatic decline in observed saving during the 1980s, a period of rapidly rising federal deficits. Instead, the other two responses have been observed: investment has declined, and the trade deficit has swelled.

This report focuses on investment trends in the federal budget. Since all federal outlays are now classified as consumption in the NIPA, any reclassification of these activities as additions to the nation's capital would serve to increase investment in the economy as measured by the NIPA. In the equation above, it would lower government spending, or G, since all the spending included in G is presumed to be consumption, and increase investment, or I, commensurately. One would then be conceptually consistent in classifying the value of that federal investment as saving, since it would no longer be consumption. While private saving need not increase, recognizing some government spending as a form of investment would imply that some portion of tax revenues is a form of collective saving by society. For the sake of simplicity, however, this report focuses on the investment side of the equation and observes how trends in federal investment could affect the accounting data for national investment.

as shown in Table 1, most of the decline in saving in this decade can be attributed to the rising federal deficit. Figure 1 illustrates the long-term trends in national saving and investment.

Much government spending, however, is for new fixed facilities and equipment that provide productive services over a long period. In many instances, such expenditures would be considered investment if undertaken by a private firm. If federal spending of this kind were considered to be as productive as private investment, the result might be to alter the picture given by official data on national saving and investment, leading to a more positive prospect for future economic growth.

This paper analyzes federal spending to determine how much of it can be counted as investment, and how large such investment is relative to net private investment and to the federal deficit. Three questions underlie the task:

TABLE 1. THE SHARE OF NATIONAL OUTPUT DEVOTED TO INVESTMENT AND SAVING (NIPA basis, in percent of net national product)

Item	1960-1969	1970-1979	1980-1981	1982-1986
Nonfederal Saving a/	9.3	10.4	9.5	9.1
Federal Saving b/	-0.3	-1.9	-2.4	-5.4
Total Saving c/	9.0	8.5	7.1	3.7

SOURCE: Congressional Budget Office, based on data from the Bureau of Economic Analysis.

a. Saving of private, business, and state and local sectors.

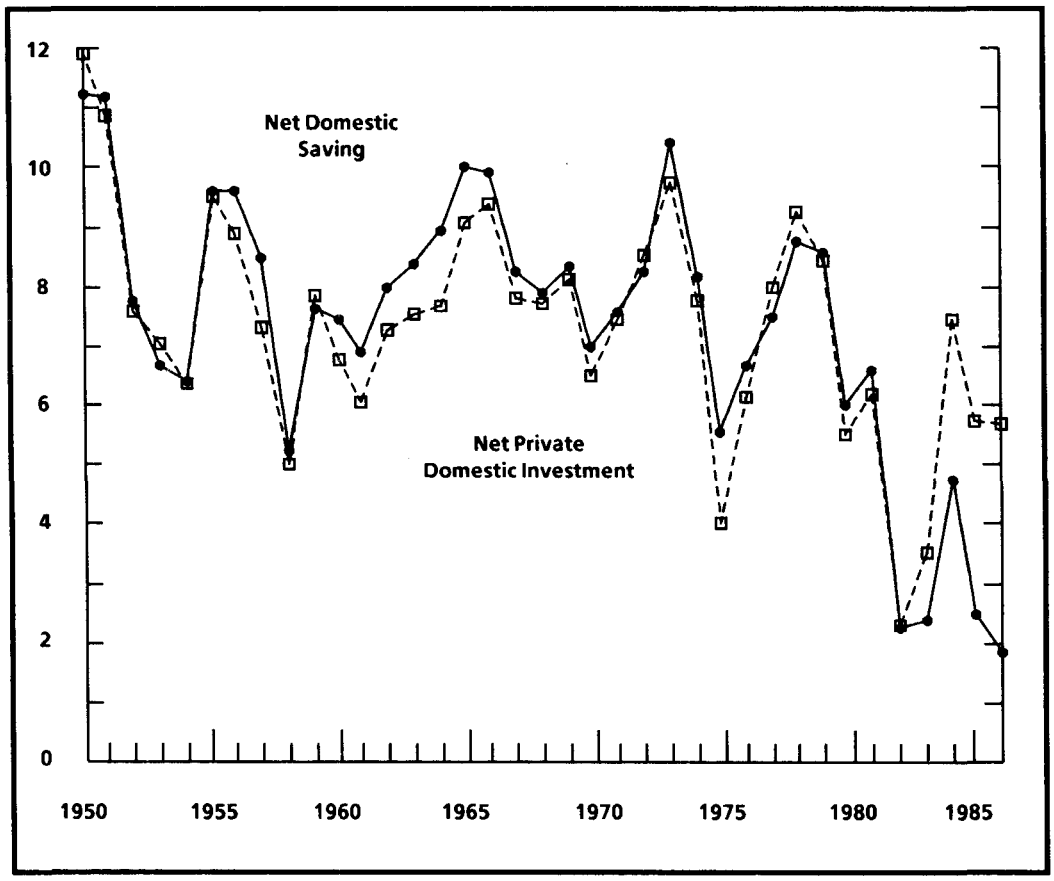
b. NIPA basis, with a negative number denoting a deficit.

c. This sum of rows 1 and 2 is also equal to domestic net investment less export surplus. Since the latter equals net foreign borrowing, line 3 is also domestically owned net investment.

- o What is investment?
- o What is its federal component?
- o How should its value be measured?

The first question seems to offer no problem. NIPA data on net private investment include new physical assets that will be used to produce future output. The second question is more difficult: answering it

FIGURE 1. NET NATIONAL SAVING AND INVESTMENT AS PERCENT OF NET NATIONAL PRODUCT



SOURCE: Congressional Budget Office, based on data from the Bureau of Economic Analysis.